

The Computer Journal

1991 Volume 34

ISSN 0010-4620

Cambridge University Press



COMPUTER JOURNAL

The British Computer Society PO Box 1454, Station Road, Swindon, Wiltshire SN1 1TG Tel: 0793 480269 ISSN 0010-4620

EDITOR-IN-CHIEF

P. Hammersley

Middlesex Polytechnic

The Burroughs, Hendon, London NW4 4BT, UK (e-mail: P.Hammersley@uk.ac.middlesex.cluster)

EDITORIAL BOARD

J. J. Florentin (Chairman), Birkbeck College, London

M. Agosti, University of Padua, Italy

D. Aspinall, UMIST, Manchester

L. Damodaran, University of Technology, Loughborough

G. E. Felton, International Computers Ltd., London

W. Morven Gentleman, National Research Council, Canada

P. Giles, Scottish Amicable Life Assurance Society

T. F. Goodwin, University of Surrey

M. Healey, University College, Cardiff

I. D. Hill, Medical Research Council, London

C. A. R. Hoare, University of Oxford

P. Kemp, University of Glasgow

S. Kent, London

G. N. Lance, University of Bristol

F. Manola, GTE Laboratories, Inc., USA

R. M. Needham, University of Cambridge

P. H. Prowse (Vice-Chairman), Gamel Systems, Billingshurst

J. Nievergelt, ETH Zurich, Switzerland

T. W. Olle, T. William Olle Associates Ltd., Surrey

C. M. Phillips, University of Southampton

E. M. Reingold, University of Illinois, USA

P. Robinson, University of Cambridge

M. A. Sabin, Fegs Limited, Cambridge

P. A. Samet, University College London

F. H. Sumner, University of Manchester

C. J. van Rijsbergen, University of Glasgow

W. M. Waite, University of Colorado, USA

P. J. L. Wallis, University of Bath

B. A. Wichmann, National Physical Laboratory

P. W. Williams, Kingston Polytechnic

R. Winder, University College London

SOCIETY OFFICERS

Publications and Advertising Manager: Ian Jones

SUBMISSION OF PAPERS

All communications should be sent to the Editor-in-Chief (address above).

Opinions expressed in The Computer Journal are those of the

authors and do not necessarily represent the views of The British Computer Society, the publisher or the organizations by which the authors are employed.

The Computer Journal is published on behalf of The British Computer Society by Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU and The Journals Department, 40 West 20th Street, New York, NY 10011-4211, USA.

Subscriptions: The Computer Journal (ISSN 0010-4620) is published six times a year, February, April, June, August, October and December. The annual subscription price for 1991 (which includes postage) is £174.00 in UK, US \$335.00 in USA and Canada, £185.00 in rest of world. Single parts cost £31.00, US \$56.00 in USA and Canada (plus postage). Orders, which must be accompanied by payment, may be sent to a bookseller, subscription agent, or to the Cambridge University Press at either of the addresses shown on this page. Copies of the journal for subscribers in USA and Canada are sent by air to New York to arrive with minimum delay. Second class postage paid at New York, NY and additional mailing offices. POSTMASTER: send address changes in USA and Canada to The Computer Journal, Cambridge University Press, 110 Midland Avenue, Port Chester, New York, NY 10573–9864.

Advertising: For details contact The Advertising Manager, British Computer Society, PO Box 1454, Station Road, Swindon, Wiltshire SNI 1TG; Tel: 0793 480269, or the American Branch of Cambridge University Press.

Members' Copies: Members of the BCS receive *The Computer Journal* at a greatly discounted rate. In the interest of the Society, members' copies should not be handed on to libraries.

© 1991 The British Computer Society.

Permission to copy for educational purposes only without fee all or part of this material is granted provided that the copies are not made or distributed for direct commercial advantage, the BCS copyright notice and the title of the publication and its date appear, and notice is given that copying is by permission of The British Computer Society. To copy otherwise, or to republish, requires specific permission and may require a fee.

For all other use, permission should be sought from the Cambridge University Press.

Copying: This journal is registered with the Copyright Clearance Center, 27 Congress St., Salem, Mass. 01970. Organizations in the USA who are registered with C.C.C. may therefore copy material (beyond the limits permitted by sections 107 and 108 of US copyright law) subject to payment to C.C.C. of the per-copy fee of \$5.00. This consent does not extend to multiple copying for promotional or commercial purposes. Code 0010-4620/91 \$5.00 + .00.

ISI Tear Sheet Service, 3501 Market Street, Philadelphia, Pennsylvania 19104, USA, is authorized to supply single copies of separate articles for private use only.

Back Issues: Volumes 1–23 are available from Wm. Dawson & Son Ltd., Cannon House, Folkestone, Kent. For volume 24 onwards contact Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU.

Printed and bound in Great Britain by Cambridge University Press, The Printing House, Shaftesbury Road, Cambridge CB2 2BS.

Contents

4.1.4 PC 1	1. T	PAGE
A. J. J. Dick A. J. J. Dick and P. Watson	An Introduction to Knuth–Bendix Completion Order-sorted Term Rewriting	2 16
M. Hermann, C. Kirchner and H. Kirchner	Implementations of Term Rewriting Systems	20
T. Nipkow	Constructive Rewriting	34
P. Padawitz	Reduction and Narrowing for Horn Clause Theories	42
P. Kacsuk	A Parallel Prolog Abstract Machine and its Multi-Transputer Implementation	52
J. Paakki	Prolog in Practical Compiler Writing	64
L. Orman	Constraint Maintenance as a Data Model Design Criterion	73
F. B. Bastani, IR. Chen and W. Hilal	A Model for the Stability Analysis of Maintenance Strategies for Linear List	80
M. A. Weiss	Empirical Study of the Expected Running Time of Shellsort	88
JL. Wu and ST. Cheng	A Neural Network Simulating System	92
D. E. Avison and A. T. Wood-Harper	Information Systems Development Research: An Exploration of Ideas in Practice	98
F. Noble	Seven Ways to Develop Office Systems: A Managerial Comparison of Office System Development Methodologies	
CC. D. Poo	Representing Business Policies in the Jackson System Development Method	122
A. G. Sutcliffe and I. Wang	Integrating Human-Computer Interaction with Jackson System Development	132
T. H. Tse and L. Pong	An Examination of Requirements Specification Languages	143
J. Trenouth	A Survey of Exploratory Software Development	153
M. E. C. Hull, P. G. O'Donoghue and B. J. Hagan	Development Methods for Real-Time Systems	164
A. Burns and A. M. Lister	A Framework for Building Dependable Systems	173
P. Hammersley	Information Systems Design Methodologies - Book Reviews	182
D. Campbell and T. McNeill	Finding a Majority When Sorting is Not Available	186
M. Ancona, A. Clematis, L. De Floriani and E. Puppo	HIDEL: A Language for Hierarchical VLSI Design	195
B. Wilkinson	Comparative Performance of Overlapping Connectivity Multi-processor Interconnection Networks	207
A. Olerup	Design Approaches: A Comparative Study of Information System Design and Architectural Design	215
M. H. O'Docherty and C. N. Daskalakis	Multimedia Information Systems – The Management and Semantic Retrieval of all Electronic Data Types	225
P. King and C. Small	Default Databases and Incomplete Information	239
R. Marshall	Manipulating Full-text Scientific Databases: A Logic-based Semantico- pragmatic Approach	245
I. A. Macleod	A Query Language for Retrieving Information from Hierarchic Text Structures	254
K. Morgan, R. L. Morris and S. Gibbs	When does a Mouse become a Rat? or Comparing Performance and	265
The Rt. Hon. the Earl of Halsbury	Preferences in Direct Manipulation and Command Line Environment 'Innovation for Failure' – Some Reflections on the Work of the NRDC	272
V. Akman	Relevant to the Early History of the Computer Industry in the UK Implementation of Karp-Luby Monte Carlo Method: An Exercise in	279
V Wiscousky D E Thomisch and M H Williams	Approximate Counting	282
K. Wicovsky, P. F. Thanisch and M. H. Williams H. Kingdon, D. R. Lester and G. L. Burn	Improved Recursion Handling through Integrity Constraints The HDG-Machine: a Highly Distributed Graph-Reducer for a	,290
D D Chillianen	Transputer Network	302
D. B. Skillicorn J. Padget, R. Bradford and J. Fitch	Practical Concurrent Programming for Parallel Machines Concurrent Object-Oriented Programming in Lisp	311
M-C. Pong	I-Pigs: an Interactive Graphical Environment for Concurrent	320
	Programming	
E. J. Yannakoudakis and A. A. Shahid K. Yue and R. T. Jacob	A Controlled Environment for Meta-Message Processing	331
	An Efficient Starvation-Free Semaphore Solution for the Graphical Mutual Exclusion Problem	345
S. Khanna	Logic Programming for Software Verification and Testing	350
J. Vanthienen	A Longest Path Algorithm to Display Decision Tables	358
A. P. Hammersley	Efficient Two-Dimensional Fast Fourier Transform Subroutines for Real- Valued or Hermitian data	362
W. Dobosiewicz	Linear Probing Sort	370
J. K. Slape and P. J. L. Wallis	A Modification of Sale's Algorithm to Accommodate FORTRAN 77	373
A. Stewart, C. Holt, M. Clint and R. Perrott	A DAP FORTRAN Subroutine for Thinning Digitised Pictures	377
E. Mäkinen	Efficient Generation of Rotational-Admissible Codewords for Binary Trees	379
C. Brink, I. M. Rewitzky and R. A. Schmidt	Autodescriptivity: beware!	380
D. J. Challab	Implementation of Flexible Arrays Using Balanced Trees	386
B. Srinivasen	An Adaptive Overflow Technique to Defer Splitting in B-trees	397
W. F. Smyth	Mu-balancing M-way Search Trees	406
S. P. Dandamudi and P. G. Sorenson	Improved Partial-Match Search Algorithms for BD Trees	415
S. Olariu, C. M. Overstreet and Z. Wen D. Naor, C. U. Martel and N.S. Matloff	A Mergeable Double-ended Priority Queue Performance of Priority Queue Structures in a Virtual Memory	423 428
E. Mäkinen	Environment A Survey on Binary Tree Codings	438
G. Argo	Weighting Without Waiting: the Weighted Path Length Tree	438
P. M. Fenwick	A New Technique for Self-Organising Linear Searches	450
S. F. Ou and A. L. Tharp	High Storage Utilisation for Single-Probe Retrieval Linear Hashing	455

C. C. Chang, C. Y. Chen and J. K. Jan	On the Design of a Machine	-Independent Perfect Hashing Scheme	469
P. Ružička	A Note on the Efficiency of an Interval Routing Algorithm		475
W. B. Daszczuk	A Structured Semantic Design of Distributed Operating Systems		482
N. T. Son and Y. Paker	Adaptive Deadlock-free Packet Routing in Transputer-based Multi- processor Interconnection Networks		493
L. Mancini and S. K. Shrivastava	Fault-tolerant Reference Counting for Garbage Collection in Distributed Systems		503
J. Dollimore, E. Miranda and Wang Xu	The Design of a System for	Distributing Shared Objects	514
M. S. Verrall	Unity Doesn't Imply Unification or Overcoming Heterogeneity Problems in Distributed Software Engineering Environments		522
D. Agrawal and A. Malpani	Efficient Dissemination of Is	nformation in Computer Networks	534
L. H. Geesink	The Coordinatation of Distriction Network Topology	ributed Active Messages in a Dynamic	542
P. Bodorik and J. S. Riordon	Threshold Values for Proces	sing Distributed Queries	551
D. Michie	Methodologies from Machin	ne Learning in Data Analysis and Software	559
L. A. Lahodynskyj	Structure Clashes		566
J. S. Rohl	Ord-Smith's Pseudo-Lexico Tompkins-Paige Algori	graphical Permutation Procedure is the thm	569
	Editorial	1, 97, 193, 289, 385, 481	

Editorial	1, 97, 193, 289, 385, 481	
Wilkes Award	112	
Correspondence	72, 206, 264, 310, 405, 427, 502, 513	
Book Reviews	15, 41, 187, 188, 194, 301, 319, 357, 396, 422, 474, 521, 533, 573	
Announcements	87, 91, 94, 121, 142, 152, 163, 181, 185, 238, 244, 271, 286, 344, 349, 381, 414, 437, 454, 468, 476, 477, 492, 541, 550, 558, 565	
Notices	188	
Additional papers	571	

